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A MONTAGUE GRAMMAR APPROACH
TO YES-NO WORDS IN JAPANESE

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Introduction. This paper deals with the problem of 'yes-no' words in Japanese. Specifically, it attempts to provide a uniform syntactic and semantic account of it in terms of categorial syntax and model-theoretic semantics of Montague Grammar.

After describing the use of Japanese 'yes-no' words, Jorden gives the following warning to her readers.

English usage [of 'yes-no' words] is as unexpected for a Japanese studying English as Japanese usage is for an American studying Japanese. Be wary of single-word answers given by a Japanese who is not fluent in English. In answer to 'Don't you have any bananas?' a 'yes' from many Japanese means 'Yes. We have no bananas.' (1962: p. 10)

Jorden attributes the cause of this kind of misunderstanding to the difference in the use of 'yes-no' words between the two languages. Consider Jorden's account presented below.

Hai [the Japanese yes word] usually means 'what you just said is right.' In answer to affirmative questions, it corresponds to English 'yes', but in answer to negative questions that anticipate a negative answer, it usually confirms the negative and corresponds to English 'no'. Lie (the Japanese no word), the opposite of hai, means 'what you have just said is wrong' and 'behaves in a parallel way: in answer to negative questions that anticipate a negative answer, it usually contradicts the negative and corresponds to English 'yes'. (1962: p. 10)

In responding to negative questions, equating the Japanese yes and the English no on the one hand and the Japanese no and the English yes on the other is not unique to Jorden's analysis. The fact of the matter is that it is a consistent position throughout conventional Japanese grammars.

The conventional explanation is a viable one to a certain extent. Consider the examples in (1) and (2).

(1)

   Nom walk-PAST-Q
   'Did John walk?'

   yes
   'Yes. John did.'
c. Iie, John-ga arukimasendesita.
   no    walk-not-PAST
   'No. John didn't.'

(2)

   walk-not-PAST-Q
   'Didn't John walk?'

   yes
   'No. John didn't.'

c. Iie, John-ga arukimasita.
   no
   'Yes. John did.'

(1a) is a positive question and 'yes-no' words are used just like in English in accord with the conventional explanations. (2a) is a negative question and hai 'yes' and iie 'no' correspond to English 'no' and 'yes' respectively. So, these examples support the conventional account.

Now consider the examples in (3).

(3)

   walk-PAST that is-not-Q
   'Isn't it the case that John walked?'

   yes
   'Yes. He did.'

c. Iie, John-ga arukimasendesita.
   no
   'No. He didn't.'

(3a) is a negative question as indicated by the English translation. So, the Japanese 'yes-no' words should behave just like they did in (2b and c). However, contrary to our expectation, the presence of the negative morpheme (masen) has no effect on the use of the 'yes-no' words and they behave as if they were in a positive question. Thus the examples in (3) refute the traditional explanation.

What examples (1) through (3) suggest is that questions and answers are interrelated with each other and can be regarded as constituting a closed system of their own. Accordingly, a linguistic analysis for one should go with that for the other. Pursuing this line of thought in what follows, I will first present an analysis of questions. Then on the basis of that analysis, I will show that it is possible to provide a uniform account for the syntax and semantics of the Japanese 'yes-no' words.

Questions. There is only one question particle (Q) in modern Japanese that can be used in both yes-no and wh- questions. Consider the examples
in (4).

(4)

   milk Acc drink-PAST
   'John drank milk.'

b. John-ga miruku-o nomimasitaka.
   drink-PAST-Q
   'Did John drink milk?'

c. John-ga nani-o nomimasitaka.
   what
   'What did John drink?'

These examples show that a) there is no wh- movement in Japanese, b) the only morphological difference between yes-no and wh- questions is the presence or absence of a wh- phrase, and c) the question particle ka follows the past tense marker ta.

Now consider the examples in (5).

(5)

   'John drank what.'

b. Dare-ga nani-o nomimasitaka.
   who drink-PAST-Q
   'Who drank what?'

c. *Dare-ga nani-o nomimasitakaka.
   drink-PAST-Q-Q

d. *John-ga miruku-o nomimasitakaka.
   drink-PAST-Q-Q

(5a) shows that in a wh-question, the presence of both a question particle and a wh- phrase is obligatory. Examples (5b,c, and d) show that Japanese allows multiple wh-questions but only one question particle is permitted per simplex sentence.

On the basis of these observations, I propose the following desiderata.

(6) desiderata: A good analysis of simplex questions should account for the following five points:

a) The question particle ka can be used in both yes-no and wh- questions.

b) The question particle follows a tensed verb phrase.

c) A wh- question requires the presence of both the particle ka at the end and a wh-phrase somewhere in it.
d) Multiple wh- questions are allowed.

e) A simplex question correlates only one question particle.

Categorial analysis. Karttunen (1978) presents a categorial analysis of questions in English in which he postulates the syntactic category Q (question). The use of this category is motivated by a need to subcategorize verbs that may take question complements. The examples in (7) demonstrate this point.

(7)

a. I do not know who is coming.

b. *I do not believe who is coming.

Now consider the examples in (8).

(8)

a. Dare-ga kuruka sirimasen.
   come-PRES-Q know-not
   'I do not know who is coming.'

b. *Dare-ga kuruka sinzimasen.
   believe-not
   'I do not believe who is coming.'

These examples show that the same contextual specifications as in English are needed in subcategorizing Japanese verbs for indirect question complements. Thus we assume the category Q in Japanese.

In treating tense, we assume that Japanese has both infinitival and tensed sentences and define the past tense morpheme as TNS/S. Notice that this will prevent the tense morpheme from recurring, which is what we want and is born out by the incorrectness of example (9).

(9)

   drink-PAST-PAST

The way we treat the tense morpheme dictates the definition of the question particle as Q/TNS. Straightforward functional rules (R_2) and (R_3) in the Appendix specify the use of the past and question particles respectively. Example (4b) has analysis tree (10).

(10)

\[
\begin{array}{c}
\text{John-ga miruku-o nomimasitaka, Q} \\
\text{ka, Q/TNS} \\
\text{John-ga miruku-o nomimasita, TNS} \\
\text{ta, TNS/S} \\
\text{John-ga miruku-o nomimas-,S}
\end{array}
\]
(11)

i) John-ga miruku-o nomimas-' \rightarrow drink'(m)(j)

ii) ta' \rightarrow \lambda pH_p

iii) John-ga miruku-o nomimasita' \rightarrow Hdrink(m)(j)

iv) ka' \rightarrow \lambda p\lambda p\exists r[\forall r \& r=r]

v) John-ga miruku-o nomimasitaka' \rightarrow \lambda p\forall q[\forall q \& q=Hdrink'(m)(j)]

The translation for (10) is given in (11) and its final line expresses a set of true propositions; i.e., it says that it is true that John drank milk if and only if he actually did it. This translation is obtainable because of our assumption that semantically, a question is a statement whose denotation is a function from possible worlds into a true proposition (i.e., a set of propositions).

(12)

Working Assumptions:

a) Japanese has phonetically null pronouns (PRO's).

b) Case markers are enclitics and get deleted when they are affixed to a null pronoun.

Now consider the following facts: although it is possible to use the question article independently of a wh- phrase, e.g., (4b), such independence is not possible with a wh- phrase, e.g., (5a).

Within the framework on which our analysis is based, there are two alternatives to capture this clausemate requirement, i.e., (6c).

(13)

Two alternatives:

a) Define the wh- phrase as Q/Q and use straightforward categorial cancellation.

b) Assign the wh- phrase expressions to wh- category (of NP type meaning) and make sure of input and output categorial conditions to insure the discontinuous dependency between the question particle and a wh- phrase.

If the first alternative is chosen, then the wh- phrase will be of type \langle s, \langle s, t \rangle, t \rangle, \langle s, t \rangle, t \rangle. This does not accord with our intuition that wh- phrases denote something like noun phrase meaning.

The second alternative, which is the one suggested by Karttunen, however enables us to treat wh- phrases as distinguished expressions of NP type denotation. Because of this semantic consideration, we adopt the second alternative and postulate wh- quantification rule (R_4).

R_4 uses substitution operation F_2,n to replace a free variable PRO_n with a wh- phrase in an input string. The translation part of the rule involves lambda-abstraction over the free variable PRO_n, thus taking care of proper binding between a wh- phrase and an input questions expression. How this
rule works to derive example (4c) is illustrated in (14):

(14)

\[
\begin{array}{c}
\text{John-ga nani-o nomimasitaka, Q} \\
\quad / \quad / \\
\text{nani, WH} \quad \text{John-ga PROi-o nomimasitaka, Q} \\
\quad / \quad / \\
\text{ka, Q/TNS} \quad \text{John-ga PROi-o nomimasita, TNS} \\
\quad / \quad / \\
\text{ta, TNS/S} \quad \text{John-ga PROi-o nomimasita}, S
\end{array}
\]

(15)

i) John-ga PROi-o nomimasita' \[\longrightarrow\] drink'(PP\{x1\})(j)

ii) ta' \[\longrightarrow\] λpHp

iii) John-ga PROi-o nomimasita' \[\longrightarrow\] Hdrink'(PP\{x1\})(j)

iv) ka' \[\longrightarrow\] λp[\[vq \& p = p\]]

v) John-ga PROi-o nomimasita' \[\longrightarrow\] λp[\[vq \& p = Hdrink'(PP\{x1\})(j)\]]

vi) nani' \[\longrightarrow\] λp \[\exists x[\text{thing}'(x) \& P{x}]\]

vii) John-ga nani-o nomimasitaka' \[\longrightarrow\] λp[\[\text{thing}'(x) \& \exists q[\[vq \& q = Hdrink'(PP\{x1\})(j)\]]\]]

The final line of (15) expresses the denotation of a set which contains each thing that John drank such that it is true that he drank it.

Our wh- quantification rule can be applied recursively to generate multiple wh- questions. How it can be done is illustrated in (16) and its translation is given in (17).

(16)

\[
\begin{array}{c}
\text{Dare-ga nani-o nomimasitaka, Q} \\
\quad / \quad / \\
\text{dare, WH} \quad \text{PROj-ga nani-o nomimasitaka, Q} \\
\quad / \quad / \\
\text{nani, WH} \\
\quad / \quad / \\
\text{PROj-ga PROi-o nomimasitaka, Q} \\
\quad / \quad / \\
\text{ka, Q/TNS} \\
\quad / \quad / \\
\text{PROj-ga PROi-o nomimasita, TNS}
\end{array}
\]

8.6
Summarizing, the presence of the question particle ka in both yes-no and wh-questions has been captured by a) setting up syntactic category Q, b) assigning the question particle to the category Q/TNS, and c) placing an input condition on each of our question rules that specifies the categorial membership of input strings in terms of the category Q.

The placement of ka after a tensed verb phrase occurs as an automatic consequence of assuming a categorial hierarchy in which questions are ranked higher than tensed sentences.

The presence of both ka and a wh-phrase in a wh-question (i.e., the clausemate requirement (3a)) has been dealt with by formulating our wh-quantification so that it will combine a wh-phrase and a question phrase.

The possibility of deriving multiple wh-questions while constraining the number of question particles in a simplex question has been accounted for by a) allowing iterative application of our wh-quantification b) specifying the output of the rule as a member of the question category.

Yes-no revisited. The structure of yes-no answers consists of two parts: a) a response word (either hai or iie) and b) a sentence that follows it. (18b) confirms this pattern.

(18)

   sleep-PAST-Q
   'Did John sleep?'

b. Hai nemasita.
   \{ John-ga \}
   Iie nemasendesita.

[________] [______________]
response sentence
Yes. did.
No. \{ John \} didn't.
Notice that while sentences can exist on their own, 'yes-no' words cannot as far as their use in relation to questions is concerned. This forces us to assign functor roles to 'yes-no' words not to sentences. Thus we define them as ANS/TNS, where ANS stands for the category of answer expressions.

ANS is a truth-value denoting category like S and TNS. However, we do not put them in the same category for some syntactic reasons. To mention a few: the use of category ANS will stop undesirable recursion of response words and bad strings like (19) will not surface at all.

    yes no
    'lit. Yes, NO, John slept.'

Also, if no separate category is used to distinguish answers from declarative sentences, ungrammatical strings like those in (20) can be generated.

    'lit. Yes, Did John sleep?'

    'lit. Bill saw the movie which yes John saw.'

A categorial rule for introducing 'yes-no' words is stated as (R5) in the appendix. Now example (18b) has analysis trees (21a and b).

(21) a. Hai John-ga nemasita, ANS
    /  \
    /    
    hai,ANS/TNS    John-ga nemasita,TNS

b. Iie John-ga nemasendesita,ANS
    /  \
    /    
    iie,ANS/TNS    John-ga nemasendesita,TNS

Semantics. In analyzing the semantics of the Japanese 'yes-no' words, we start from observations made by Jorden (1962) and Martin (1962) respectively. Jorden's observation is repeated below in (22) for convenience and Martin's is presented in (23).

(22) Hai usually means 'what you just said is right'. In answer to affirmative questions, it corresponds to English 'yes', but in answer to negative questions that anticipate a negative answer, it usually confirms the negative and corresponds to English 'no'. *Iie, the opposite of hai, means 'what you just said is wrong' and behaves in a parallel way: in answer to negative questions that anticipate a negative answer, it usually contradicts the negative and corresponds to English 'yes'. (1962, p. 10)
The words **hai** and **iie** (or **e**) are used to mean 'what you've said is correct' and 'what you've said is incorrect.' So if you state a question in a negative way, the standard Japanese answer turns out to be the opposite of standard English 'yes' and 'no'. (1962, pp. 364-365)

Both Jorden and Martin are in agreement on the point that Japanese 'yes-no' words pick up as their reference the question that has just been addressed to the speaker.

Notice that they use the phrases 'what you just said...' and 'what you've said...' to stress this point.

That 'yes-no' words are tied up with a particular question in discourse is supported by abnormal discourse exchanges like the one in (24).

(24) (uttered in the order given)

Speaker A: John-ga nemasitaka. 'Did John sleep?'

Speaker B: Mary-ga kimasitaka. 'Did Mary come?'

Speaker C: Hai, John-ga nemasita. 'Yes. John slept.'

What both Jorden and Martin might have been aware of but failed to point out explicitly is that 'yes-no' words are indexicals just like pronouns 'I' and 'you' and have a fully fixed reference. In the following we take care of this indexical property by postulating the indexical variable of question type $Q_a$, whose assignment value in a given model can be fixed something like in (25).

(25)

$$g(Q_a) = \text{the question that has just been addressed to the speaker.}$$

Next thing that we need to examine is what is asserted by 'yes-no' words. Again, we begin by considering what Jorden and Martin have said about it.

(26) Jorden's

**Hai** usually means 'what you just said is right,.' . **Iie**, the opposite of hai, means 'what you just said is wrong'.

(27) Martin's

The words **hai** (or **e**) and **iie** are used to mean 'what you've said is correct' and 'what you've said is incorrect'.

(26) and (27) respectively contain a pair of expressions, namely 'right and wrong' and 'correct and incorrect', which are in model-theoretic terms locationally invariant. Thus we interpret them into model-theoretic expressions 'factually true and false'.

Now we ask what is the linguistic commitment we make when we utter answer
statements. Let's take a particular case and try to provide an answer to this question. Suppose that we have just been asked question (18a) and are about to give an answer as felicitously as possible. By saying hai, we commit ourselves to telling the hearer three things:

(28)
   a) We know an answer to the question.
   b) This answer is factually true.
   c) When this answer is applied to the question, the result is affirmative. And if such is the case, then this answer is the one that constitutes the second part of the reply.

By saying nai, also we express three things. The first two are the same as in (28). The third point is the same as in (28c) except that in this case the result is negative.

(29)
   a) The same as in (28a).
   b) The same as in (28b).
   c) When this answer is applied to the question, the result is negative. And if such is the case, then this answer is the one that constitutes the second part of the reply.

Now let's apply these three points to our case in hand. Upon responding to question (28a) with (28b) a) we know an answer, b) this answer is factually true, and c) when this answer is applied to question (28a), the result is affirmative and if such is the case, then this answer is that John slept. Similarly, a negative answer to the same question can be given a viable description.

Before we discuss the relationship between negative questions and 'yes-no' answers, we summarize what we have described of 'yes-no' words. Then we state it formally.

The 'yes-no' words in Japanese can be characterized in terms of the following four features.

   a) They are indexical expressions and have fixed reference, which is the question just addressed to the answerer.
   b) They express that the speaker knows an answer to the question.
   c) That answer is factually true.
   d) Applied to the question, this answer yields a positive or negative value and if such is the case, that answer is forthcoming.

The two intensional logic expressions in (31) formally represent the semantics of hai and nai.
In discourse (28), (28b) has analysis tree (32) and translation (33).

(32)

 Hai John-nemasita, ANS
 /               \
 hai,ANS/TNS     John-ga nemasita,TNS

(33)

 i) John-ga nemasita' ----> Hsleep'(j)
 ii) hai' ----> λp[q≤q & Qa(q) ----> q=p]]
 iii) hai John-ga nemasita' ----> λq[q≤q & Qa(q) ----> q=Hsleep'(j)]

Recall that because of the indexical nature of 'hai', the Q_a above is actually (28a). If we replace it with the intentional logic expression of (28a), we will obtain (34), which is a true proposition if and only if it is true that John slept.

Negative questions and 'yes-no' words. We started this paper by noting the well-known contrast between English and Japanese in the use of 'yes-no' words in answer to negative questions. That is, the Japanese yes corresponds to the English no and the Japanese no to the English yes. Emphasizing this difference, Jorden goes on to say:

(34)

To sum up: the meaning of hai and iie occurring in answer to a yes-no question usually depends on the inflecting form of the preceding questions [positive or negative]. ... (1962, p. 11).

Is Jorden correct in asserting that a) the meaning of the Japanese 'yes-no' words is not constant and b) it varies depending on whether the preceding question is negative or positive? Our answer is a definite 'no'. In other words we say that the meanings of those words are fixed and not dependent on the preceding question. This will become clear as we consider cases like those in (35).

(35)

            sleep-not-PAST-Q
            'Didn't John sleep?'

Case I:

Speaker B:  (knowing that John didn't sleep)

   yes
   'No. John didn't.'
sleep-PAST
'lit. Yes. John did.'

Case II:

Speaker B: (knowing that John slept)

d. Iie, John-ga nemasita.
no
'Yes. John did.'

e. *Iie, John-ga nemasendesita.
'lit. No. John didn't.'

We will examine Case I first. Compare (36a) and (36b), which show the syntactic and semantic derivations of (35b and c) respectively in the present analysis.

(37)

Case I \[\neg \text{sleep}'(j)\] = 1

a.

Hai, John-ga nemasendesita, ANS

 hai,ANS/TNS

 John-ga nemasendesita,TNS

ai) hai' \[\lambda p]q[q \& [Q_\alpha(q) \rightarrow p = q]]

a(ii) John-ga nemasendesita' \[\neg \text{sleep}'(j)\]

a(iii) hai, John-ga nemasendesita' \[\exists q[q \& [Q_\alpha(q) \rightarrow p = \neg \text{sleep}'(j)]] \]

Q_\alpha = \lambda p]q[q \& q = \neg \text{sleep}'(j)]

ai(v) hai, John-ga nemasendesita' \[\exists q[q \& [\exists p[p = \neg \text{sleep}'(j)]]] \]

b.

Hai, John-ga nemasita,ANS

 hai,ANS/TNS

 John-ga nemasita,TNS

bi) hai' \[\lambda q\exists q[q \& q = \neg \text{sleep}'(j)]]

b(ii) John-ga nemasita' \[\text{sleep}'(j)\]

b(iii) hai, John-ga nemasita' \[\exists q[q \& [Q_\alpha(q) \rightarrow p = \text{sleep}'(j)]] \]

Q_\alpha = \lambda q\exists q[q \& q = \neg \text{sleep}'(j)]

b(iv) hai, John-ga nemasita' \[\exists q[q \& [\exists p[p = \neg \text{sleep}'(j)]]] \]
Our analysis assigns a value 'true' to good answer (35b) and a value 'false' to bad answer (35c). Needless to say that is what we want. A quick consideration of Case II shown below shows that our analysis accounts for the proper use of the word iie in answer to negative questions.

\[(38)\]

Case II \(\{\text{Hsleep}'(j)\} = 1\)

\(\text{a.}\)

\(\text{iie, John-ga nemasita,ANS}\)

\(/\)

\(\text{iie,ANS/TNS}\)

\(\text{John-ga nemasita,TNS}\)

\(\text{ai)}\) \(\text{iie'} \longrightarrow \lambda p\left[\forall q \land \left[\forall Q_a(q) \longrightarrow p=q\right]\right]\)

\(\text{a(ii)}\) \(\text{John-ga nemasita'} \longrightarrow \text{Hsleep}'(j)\)

\(\text{a(iii)}\) \(\text{iie, John-ga nemasita'} \longrightarrow \lambda p\left[\forall q \land \left[\forall Q_a(p) \longrightarrow p=\text{Hsleep}'(j)\right]\right]\)

\(\text{b.}\)

\(\text{iie, John-ga nemasendesita,ANS}\)

\(/\)

\(\text{iie,ANS/TNS}\)

\(\text{John-ga nemasendesita,TNS}\)

\(\text{b(i)}\) \(\text{iie'} \longrightarrow \text{the same as in (37ai)}\)

\(\text{b(ii)}\) \(\text{John-ga nemasendesita'} \longrightarrow \text{Hsleep}'(j)\)

\(\text{b(iii)}\) \(\text{iie, John-ga nemasendesita'} \longrightarrow \lambda p\left[\forall q \land \left[\forall Q_a(p) \longrightarrow p=\text{Hsleep}'(j)\right]\right]\)

To recapitulate, our semantic analysis has been formulated solely on the basis of data containing 'yes-no' words in answer to positive questions. However, our account of (35) has revealed that it is also applicable to 'yes-no' words in answer to negative questions of the type represented by (2). This result is surprising because it suggests that in a uniform way, our analysis can take care of the alleged polarizing behavior of 'yes-no' words like the one illustrated by the contrast between (1) and (2).

As far as the negative question case we have just examined, the use of 'yes-no' words is in contrast between Japanese and English. However, such a contrast is not always present as we noted back in section 1. Sometimes their use seems to be the same in the two languages. Consider again the examples in (3), which are repeated below for convenience.

\[(39)\]

\(\text{a.}\)

\(\text{John-ga aruita n zya arimasenka.}\)

'Isn't it the case that John walked?'
   'Yes. John did.'

c. Iie, John-ga arukimasendesita.
   'No. She didn't.'

(39a) is a negative question. However, the use of 'yes-no' words is just like that of English and the expected semantic shift does not take place. Is the present analysis capable of handling this case? If it is, then our analysis will cover all of the three cases we have presented in section 1, which have forced conventional grammars to provide non-uniform semantic accounts of the Japanese 'yes-no' words.

The most widely accepted account of the semantics of patterns no desu and no zya arimasen is that they are factives and implicatively presuppose the truth of linguistic contents embedded under them. However, it seems wrong to assume that they belong to the same class as real implicative factive verbs like wasure 'forget'. This is because they behave differently under negation. Consider (40).

(40)

a. true factive: the presupposition (that Bill walked) remains the same under negation.

John-ga Bill-ga aruita no-o wasureta.
   that forget-PAST
   'John forgot that Bill walked.'

John-ga Bill-ga aruita no-o wasuremasendesita
   forget-not-PAST
   'John didn't forget that Bill walked.'

b. no desu and no zya arimasen: negation affects the truth value of the embedded content.

Bill-ga aruita no desu.
   'It is the case that Bill walked.'

Bill-ga aruita n zya arimasen.
   'It is not the case that Bill walked.'

Under negation, presuppositions of factive verbs are not affected. However, the examples in (40b) show that it has an effect on the factivity of a complement of the verb no desu, and it reverses its truth value. This means that the extensional meaning of no desu and no zya arimasen expresses denotatively the truthhood of propositions that they predicate. In order to capture this property, we need to include the truthhood requirement in their assertion parts. Thus we give the translation in (41).

(41)  

\[
\text{no desu} \quad \rightarrow \quad \lambda x [\forall y \ r(x, y) \land r = p] \\
\text{no zya arimasen} \quad \rightarrow \quad \lambda x [\forall y \ r(x, y) \land r = p]
\]
Now example (39a) has analysis tree (42) and translation (43).

(42)  
\[
\text{John-ga aruita n zya arimasenka, Q} \\
\text{ka, Q/TNS} \\
\text{John-ga aruita n zya arimasen, TNS} \\
\text{no zya arimasen, TNS/TNS} \\
\text{John-ga aruita, TNS}
\]

(43)  
i) \text{John-ga aruita} \rightarrow \text{Hwalk' (j)}  
ii) \text{John-ga aruita n zya arimasen'} \rightarrow \lambda \text{p} \exists q [\forall q & q = \text{Hwalk' (j)}]  
iii) \text{John-ga aruita n zya arimasenka'} \rightarrow \lambda \text{p} [\exists q [\forall q & q = \text{Hwalk' (j)}]]

Notice that the last line of (43) says that this question denotes value true if and only if it is true that John didn't walk. (39c) will be accepted as a legitimate answer.

Now consider (44), which represents syntactic and semantic derivations of example (39b) in the present analysis.

(44)  
\[
\text{Hai, John-ga arukimasita, ANS.} \\
\text{Hai, ANS/TNS} \\
\text{John-ga arukimasita, TNS}
\]

i) \text{John-ga arukimasita'} \rightarrow \text{Hwalk' (j)}  
ii) \text{Hai} \rightarrow \lambda \text{p} [\exists q [\forall q & q = \text{Hwalk' (j)}] \rightarrow q = 'p]  
iii) \text{Hai, John-ga arukimasita'} \rightarrow \lambda \text{p} [\exists q [\forall q & q = \text{Hwalk' (j)}]]

Q_a = (43iii)

iv) \lambda \text{p} [\exists q [\forall q & q = \text{Hwalk' (j)}] \rightarrow p = \text{Hwalk' (j)}]

Notice that the antecedent of the material implication is false in this instance. As long as it is felicitous, (39b) is construed as a good answer (i.e., in the typical account, this is said to be the matching between the questioner's presupposition and the answer provided). The case represented by (39c) can be explained in a similar fashion.

In the past the following kind of dichotomous explanations have been offered for the case we have just considered. It goes like this: there are two questions with respect to presuppositions.

(45)  
a) those which contain presuppositions (i.e., often referred to as questioner's anticipation)  
b) those which contain no presuppositions (i.e., neutral questions)
It has been claimed that with respect to the first type, the Japanese 'yes-no' words are used just to express agreement or disagreement on the speaker's part with what has been presupposed. When used in response to neutral questions, they affirm or refute questioned facts. A classical example of the type a) is a question like (39a). Kuno (1973), for instance, explains that (39b) is an acceptable answer if and only if question (39a) is construed as a neutral question without any presuppositions. Our analysis says that irrespective of presuppositions, it is a good answer.

What the present analysis has shown us, however, is that it is false to attempt to account for the alleged dichotomous use of the Japanese 'yes-no' words in terms of a classificatory system of presuppositions. This is so because such an analysis will miss the point that in cases like (39) it is not a presupposition but an assertion of truthhood that is affirmed or denied.

Conclusion. I have presented a uniform analysis of 'yes-no' words in Japanese within the framework of Montague grammar. In so doing, an assumption is made that questions and answers interact with each other and constitute an interrogative system. Syntactically, we have followed Karttunen's assumption that a question is a statement that denotes a function from our knowledge about how the world can be into the actual status of the world.

By adopting our semantic analysis of questions, we have succeeded in formulating a uniform account of the use of 'yes-no' words in Japanese. The thrust of our analysis is the idea that 'yes-no' words are indexicals and semantically interplay with their reference. As far as the alleged semantic shift of 'yes-no' words in relation to different types of 'yes-no' questions is concerned, it has been shown that it is not the meaning of those words that shifts according to syntactic environments but a perceived shape of the world considered valid in a given linguistic situation.
## APPENDIX

<table>
<thead>
<tr>
<th>LEXICON</th>
<th>CAT</th>
<th>BASIC EXPRESSIONS</th>
<th>TRANSLATIONS</th>
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<tbody>
<tr>
<td>NP</td>
<td>John</td>
<td>PP j</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bill</td>
<td>PP b</td>
<td></td>
</tr>
<tr>
<td>PROι</td>
<td></td>
<td>PP xι</td>
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<tr>
<td>PROj</td>
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<td>PP xj</td>
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</tr>
<tr>
<td>CN</td>
<td>miruku</td>
<td>milk'</td>
<td></td>
</tr>
<tr>
<td>WH</td>
<td>dare</td>
<td>(\lambda F\exists x[\text{person'}(x) \land P_j])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nani</td>
<td>(\lambda F\exists x[\text{thing'}(x) \land P_j])</td>
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<tr>
<td>IV</td>
<td>aruk-</td>
<td>walk'</td>
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<tr>
<td></td>
<td>ne-</td>
<td>sleep'</td>
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</tr>
<tr>
<td></td>
<td>nemur-</td>
<td>sleep'</td>
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<tr>
<td>TV</td>
<td>nom-</td>
<td>drink'</td>
<td></td>
</tr>
<tr>
<td>IV/Q</td>
<td>sir-</td>
<td>know'</td>
<td></td>
</tr>
<tr>
<td>TNS/S</td>
<td>ta</td>
<td>(\lambda pHp)</td>
<td></td>
</tr>
<tr>
<td>Q/TNS</td>
<td>ka</td>
<td>(\lambda P\exists q\exists [q \land q = p])</td>
<td></td>
</tr>
<tr>
<td>ANS/TNS</td>
<td>hai</td>
<td>(\lambda P\exists q[q \land [Q_a(q) \rightarrow q = p]])</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iie</td>
<td>(\lambda P\exists q[q \land [\sim Q_a(q) \rightarrow q = p]])</td>
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</tr>
<tr>
<td>TNS/TNS</td>
<td>no desu</td>
<td>(\lambda P\exists q[q \land q = p])</td>
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<tr>
<td></td>
<td>no zya arimasen</td>
<td>(\lambda P\exists q[q \land q = p])</td>
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<tr>
<td>S/S</td>
<td>masen</td>
<td>(\lambda P\sim p)</td>
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<tr>
<td>S</td>
<td>(\sim)</td>
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<td>TNS</td>
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<td>Q</td>
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### RULES

\[R_1\] \(B \subseteq P_A\)

\[R_2\] If \(\langle P_{TNS/S} \land \beta(P_q)\), then \(F_1(\langle \cdot, \cdot \rangle) \subseteq P_{TNS}\), where \(F_1(\langle \cdot, \cdot \rangle) = \beta - d\) and translates as \(\langle \cdot \rangle\).

\[R_3\] If \(\langle P_{Q/TNS} \land \beta \subseteq P_{TNS}\), then \(F_1(\langle \cdot, \cdot \rangle) \subseteq P_Q\), where \(F_1(\langle \cdot, \cdot \rangle) = \beta\) - the same as in \(R_2\) and translates as \(\langle \cdot \rangle\).
R₄ If α(πₜ, WH and β(πₚ, Q, then F₂,n (α, β) ₕ Q, where F₂,n (α, β) = ₁
and ₁ comes from /ₕ replacing the first occurrence of PROₙ in /ₕ by α
and the other occurrences of PROₙ in /ₕ by PRO respectively and
F₂,n (α, β) translates as λπₙα[hₙ(πₚ)] .

R₅ If α(πₐ/TNS and β(πₚ, TNS', then F₃ (α, β) ₕ TNS', where F₃
(α, β) = αβ and translates as α(πₚ).

R₆ If α(πₚ/TNS and β(πₚ, TNS', then F₁ (α, β) ₕ TNS', where F₁
(α, β) = the same as in R₂ and translates as hₚ(πₚ).

REFERENCES


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